

**THREE CUCKOO WASPS FROM SIBERIAN AND BALTIC AMBER  
(HYMENOPTERA: CHRYSIDIDAE: AMISEGINAE AND ELAMPINAE)**

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*Abstract.*—*Protamisega khatanga* Evans (Amiseginae) from Siberian amber is redescribed. *Protadelphe aenea* (Amiseginae) and *Palaeochrum diversum* (Elampinae), both new genera and species, are described from Baltic amber. *Omalus primordialis* Brues is assigned questionably to *Palaeochrum*.

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A. P. Rasnitsyn, Palaeontological Institute, USSR Academy of Sciences, Moscow, invited me to study and describe two fossil Chrysididae from Baltic amber. The present opportunity is taken to redescribe *Protamisega khatanga* Evans from Siberian amber and to comment on the position of *Omalus primordialis* Brues. The specimens were studied in immersion oil having a similar refractive index to that of the amber.

**Subfamily Amiseginae**

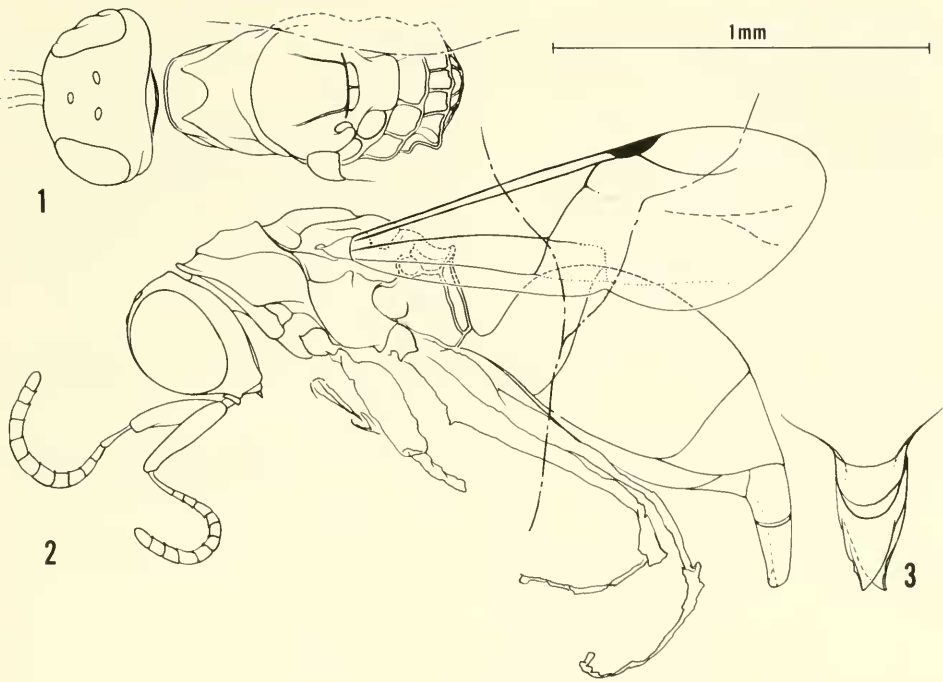
The Amiseginae is a tropicopolitan group. The fossil record is scanty, the only known genera being *Protamisega* Evans from Siberian amber of Upper Cretaceous age and *Protadelphe*, new genus, from Baltic amber of Upper Eocene age. Both areas of what is now northern Eurasia had a warm tropical climate during those ages. Recent Amiseginae maintain an essentially tropical habitat with outliers in Mexico, southern United States, China, Japan, southeastern Australia and southeastern Africa exclusive of Madagascar.

Hosts are known for four genera and nine species of Amiseginae (Krombein, 1983: 8). All were reared from walking stick eggs (Phasmatodea). The similarly shaped, sharply pointed mandibles in females of all recent amisegines is presumptive evidence that all recent genera parasitize such eggs, for the mandibles are adapted to pierce the tough cuticle of the egg for feeding and oviposition. Regrettably, no such presumption can be made for the fossil genera. *Protamisega* is a male and the oral area in the *Protadelphe* female is obscured by an opaque milky inclusion (mold or regurgitated material). The latter genus, however, is so closely related to *Adelphe* Mocsary, that such a host relationship is likely. The earliest phasmatid fossils are Paleocene (Sharov, 1971: 121), so phasmatids would have been available as hosts when *Protadelphe* was active.

***Protamisega khatanga* Evans**

Figs. 1-3

The genus and species were described from a unique specimen in Baltic amber of Upper Cretaceous age from Taimyr Peninsula, North Siberia (Evans, 1973:



Figs. 1-3. *Protamisega khatanga*. 1, Head and thorax (dorsal view). 2, Habitus (lateral view; Y across base of abdomen denotes fracture lines). 3, Apex of abdomen (ventral view).

176-177, figs. 9-10). The specimen is somewhat distorted and some details are difficult to ascertain.

**Male.**—Head and thorax dark brown, abdomen lighter brown, appendages quite pale, giving overall appearance of some decolorization; no visible vestiture. Length 2.0 mm, forewing 1.3 mm.

**Head:** Dorsal and lateral views (Figs. 1, 2); eyes moderately bulging, ocular setae not visible at 150 $\times$ , height two-thirds head width; antenna 13-segmented, pedicel longer than first flagellar segment, first and second flagellar segments subequal in length; front of head not visible; mandible largely obscured but apex with sharp point; malar space not grooved.

**Thorax:** Dorsal and lateral views (Figs. 1, 2); pronotum moderately long, without lateral lobe, not extending to tegula, anteriorly with transverse carina that curves toward midline, without median groove or fovea; notauli diverging anteriorly but not reaching anterior margin of scutum; scutellum twice as long as metanotum, anteriorly with transverse median groove divided by longitudinal carina; metanotum raised slightly above level of propodeum; propodeum short dorsally, transversely carinate posteriorly, surface with several longitudinal carinae delimiting a series of foveae, posterolaterally obtusely angulate; posterior propodeal surface abruptly declivous, apparently with several carinae radiating outward from area of abdominal attachment; lateral thoracic sculpture obscure; forewing as figured; legs rather distorted, tarsal claws possibly simple.

**Abdomen:** Lateral view (Fig. 2), terminal segments in ventral view (Fig. 3); four normally exposed segments, terminal segments exerted to form a tapering tele-

scoped tube in lateral view; male terminalia visible in ventral view with compound microscopy but detailed structure not resolvable.

Female.—Unknown.

Type-depository.—Palaeontological Institute, USSR Academy of Sciences, Moscow, No. 3130-19.

Discussion.—The discovery that the specimen is a male, not a female as believed earlier, explains the apparent anomaly of the decidedly unfeminine antennae. Amisegine females have an elongate first flagellar segment that is substantially longer than either the pedicel or second flagellar segment (cf. Fig. 5). *Protamisega* has the first and second segments short and subequal in length.

The anterior scutellar groove of *Protamisega* is unique among the Amiseginae. A similar groove, however, or modifications in the form of a pair of anterolateral pits, is a common feature in many genera of Bethyilidae.

The relatively short metanotum suggests that *Protamisega* is closer to the more primitive New World genera of Amiseginae and to the recently described African *Anachrysis* (Krombein, 1986) than to the more highly specialized Australasian or African series of genera. *Protamisega* has no close affinity to *Anachrysis* or to the New World *Amisega* Cameron, *Mesitiopterus* Ashmead and *Microsega* Krombein. The latter four genera have the dorsal surface of the propodeum rounding gradually into the lateral and posterior surfaces and not angulate posterolaterally.

Males of the New World *Adelphe* Mocsary and *Duckeia* Costa Lima have a relatively short metanotum and also possess dentate posterolateral angles of the propodeal dorsum. Both genera differ from *Protamisega* in having a malar groove and parapsidal furrows, and lack the transverse series of propodeal foveae. *Duckeia* lacks an occipital carina; it also lacks an anterior carina on the pronotal disk, and has a median groove on the pronotum. *Adelphe* has an anterior carina on the pronotal disk as well as an occipital carina. I do not regard either of these recent genera as particularly close to *Protamisega*. The Eocene *Protadelphe* described below perhaps is closer to the Cretaceous *Protamisega* but has already diverged considerably by developing a malar groove, an occipital carina, a much better defined pronotal lobe, a posteromedian fovea on the pronotum, the loss of the anterior scutellar groove, and the metanotum at the same level as the propodeum.

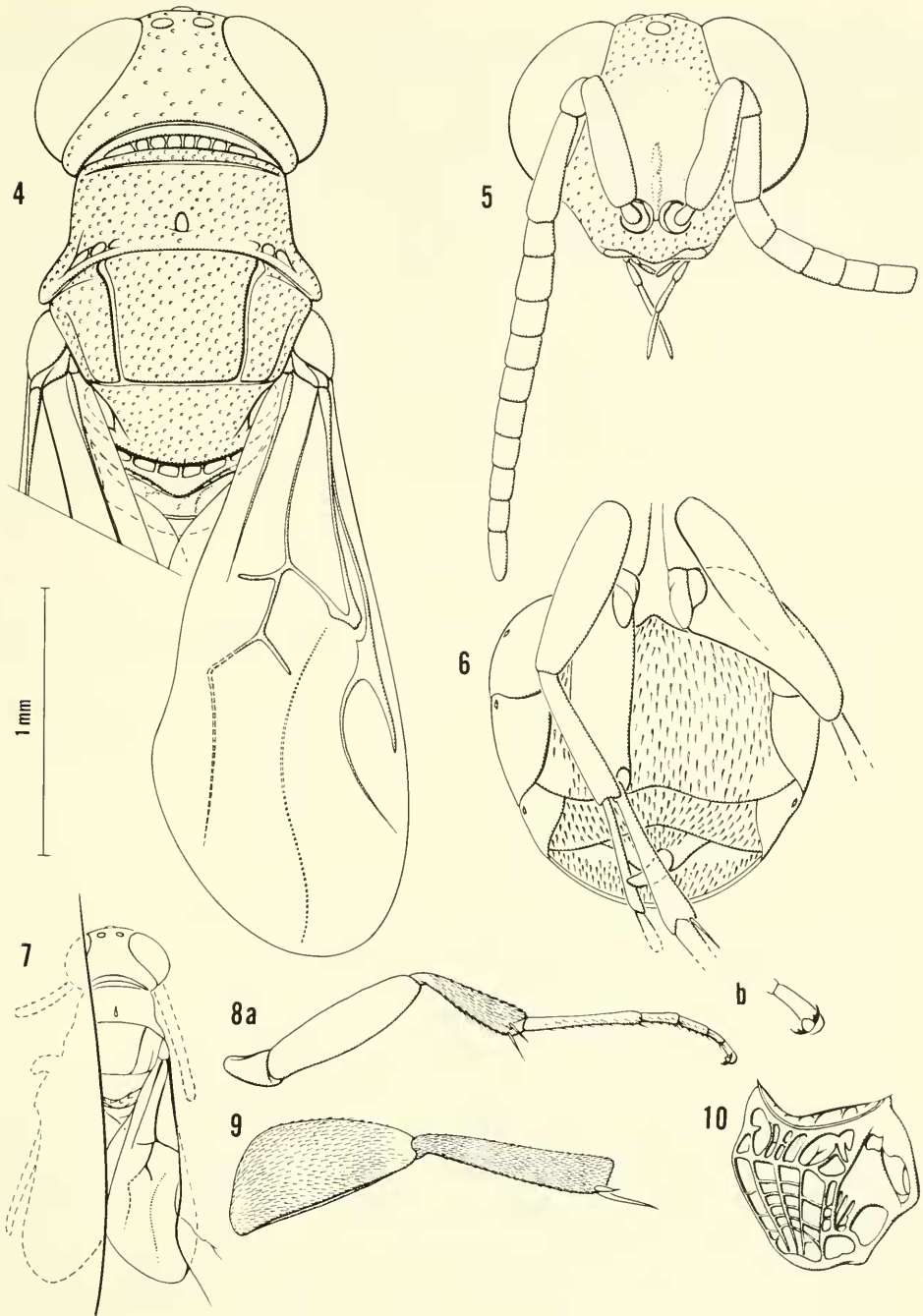
#### *Protadelphe* Krombein, NEW GENUS

Type-species.—*Protadelphe aenea* Krombein, new species.

Etymology.—The generic name is feminine and is derived from the Greek *protos*, first, and *adelphe*, sister.

Female.—Small, fully winged, relatively stocky amisegine.

*Head*: Dorsal and frontal views (Figs. 4, 5); apex of mandible not visible; malar areas strongly convergent below, about half as long as eye height, with groove from lower eye margin toward mandible; scapal basin moderately concave, smooth; eye moderately bulging, converging strongly above, ocular setae not visible at 150×; ocelli small, set in compact triangle, hind ocelli separated from each other by about diameter of ocellus, lateral ocellar distance half that; occipital carina well-developed but not margined by anterior crenulate groove; vertex without median ridge; antenna 13-segmented; flagellar segments 2–6 with flattened sensory areas beneath (cf. Krombein, 1983: 71, figs. 41 et seq.), venter of segments 7–11 not visible.



Figs. 4–10. *Protadelphe aenea*. 4, Head, thorax and right forewing (dorsal view). 5, Head (frontal view). 6, Abdomen and part of legs (ventral view). 7, Habitus (dorsal view of part clearly visible, reduced). 8a, Midleg except coxa. 8b, Tarsal claws of midleg (enlarged). 9, Hind femur and tibia. 10, Propodeum (right oblique aspect from above).



*Thorax*: Dorsal view (Fig. 4); pronotal collar with transverse row of foveae, disk carinate anteriorly but not laterally, posteriorly with small median pit, lobe almost attaining tegula; scutum with notauli complete, curved outward on anterior third, parapsidal line present on apical two-thirds; scutellum two-thirds as long as scutum; metanotum a third as long as scutellum, transversely foveate at base, not raised above level of propodeum; mesopleuron not carinate anteriorly; right oblique aspect of propodeum from above (Fig. 10); dorsal propodeal surface short, with some quadrilateral foveae of irregular size, slightly angulate posterolaterally; posterior propodeal surface with several carinae radiating outward from abdominal attachment, divided into foveae of irregular size by transverse carinae; lateral propodeal surface mostly smooth but with some irregular foveae posteriorly; mid- and hind legs (Figs. 8, 9); mid coxae slightly separated; femora beneath with scattered longer setae occasionally visible; hind femur robust; tibial spurs 1-2-2; tarsal segments with two rows of tiny spines beneath; tarsal claw (Fig. 8b) with small erect tooth; forewing (Fig. 4), membrane moderately setose, Cu and m-cu nebulous but deeply stained.

*Abdomen*: Ventral view (Fig. 6), dorsal aspect concealed by wings; four normally exposed segments, telescoped apical section of ovipositor extruded.

Male.—Unknown.

Discussion.—*Protadelphe* is clearly a precursor of *Adelphe* in that particular amesegine lineage. Important developments in *Adelphe* are the relatively long ocular setae visible as low as  $8\times$ , the wider dispersion of the ocelli, the crenulate groove on the vertex anterior to the occipital carina, the extension of the anterior pronotal carina along the sides, the lack of a posteromedian pronotal fovea, and the development of an anterior carina on the mesopleural disk.

#### *Protadelphe aenea* Krombein, NEW SPECIES

Figs. 4–10

Female.—Length 3.4 mm, forewing 2.2 mm. Head and thorax with bronze reflections, abdominal integument not visible; scape, much of flagellum, femora, fore and mid tibiae and all of fore and mid tarsi light beneath, probably reddish in life. Wings hyaline, somewhat infumated in marginal and submarginal cells, costa and stigma dark brown, other veins red. Vestiture short, suberect, sparser on head than on thoracic dorsum and abdominal venter.

*Head*: Height 0.8 times width and 1.4 times eye height; least interocular distance 0.3 times head width; clypeus with rounded median lobe, narrow emargination between lobe and lateral area, apex not thickened; antennal scape slightly shorter than combined lengths of pedicel and first flagellar segment, the latter about as long as next three segments combined; clypeus and front with small separated punctures, vertexal punctures even more scattered.

*Thorax*: Dorsum of pronotum, scutum and scutellum with small punctures mostly separated by two to three times diameter of a puncture.

*Abdomen*: Punctures of venter small and presumably as close as on thoracic dorsum as indicated by the fungus-encrusted setae.

Type-locality and -depository.—Recent beach of Gdansk Gulf, Poland, Janina Chociwska; redeposited from the "Blaue Erde" of Upper Eocene, Sambian Peninsula west of Kaliningrad, USSR. Museum of the Earth, Warsaw, Poland, No. 6473.

Note.—This unique specimen is quite well preserved in an irregular piece of amber. There is a white deposit, perhaps due to regurgitation, in the mandibular area that extends upward as a thin coating on the lower front, obscuring the frontoclypeal suture but not the punctation of that area. The abdomen, area between the coxae, and small areas of the pronotum are coated with a feltlike fungus that obscures the abdominal integument and extends onto the sternal vestiture causing it to appear like small prickles rather than fine setae. Polishing compound that had been used to prepare the specimen infiltrated along hairline fractures, causing opacity of the right forewing and concealing the hindwing and abdominal dorsum.

### Subfamily Elampinae

Recent Elampinae occur in all of the major zoogeographic regions, but the fossil record is scanty. Recent members of the subfamily parasitize a wide spectrum of wasps and bees with diverse nesting habits including those nesting in the ground or in cavities in wood.

#### *Palaeochrum Krombein*, NEW GENUS

Type-species.—*Palaeochrum diversum* Krombein, new species.

Etymology.—The generic name is neuter and is derived from the Greek *palaaios*, ancient and *chroma*, color of the skin (as in *Hedychrum*).

Male.—Small, densely and finely punctate elampine with four normally exposed abdominal segments.

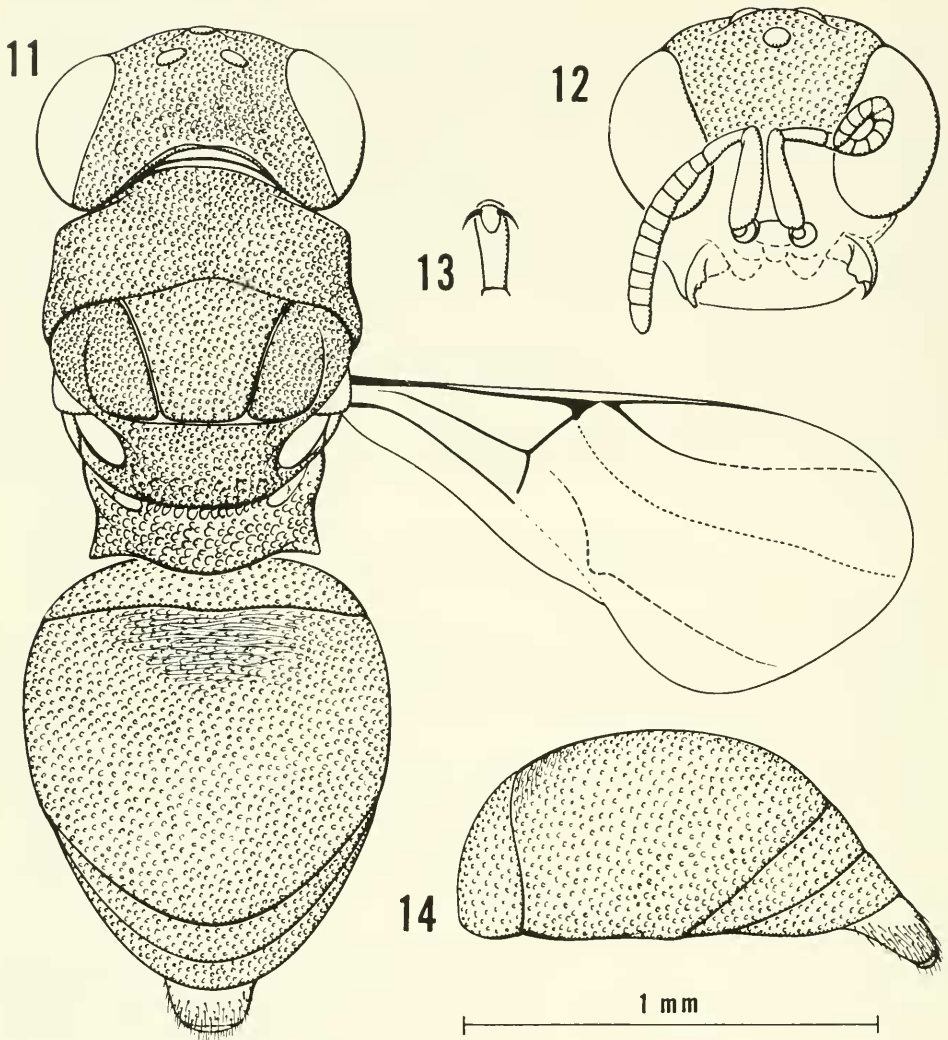
*Head*: Dorsal and frontal views (Figs. 11, 12), much of oral region and lower front obscured by flocculent exudate; mandibles protruding beyond flocculus, tridentate apically, outermost tooth longer; apex of clypeus apparently trilobed; scapal basin obscured; head width almost twice eye height; ocular setae not visible at 150×; genal carina strong, margined anteriorly by crenulate groove; occipital carina absent; antenna 13-segmented.

*Thorax*: Dorsal view (Fig. 11); mesopleuron not carinate anteriorly or produced forward; propodeum with short posterolateral angles; venation of forewing difficult to resolve due to hairline fracture that admitted air, but stigma small, marginal cell almost closed but apical section may be nebulous, discoidal cell lacking; tibial spurs 1-2-2; tarsal claws simple (Fig. 13).

*Abdomen*: Dorsal and lateral views (Figs. 11, 14); segments 1–4 normally exposed, with metallic coloration; 5 and apex of 6 exerted, not metallic; sternum slightly concave.

Discussion.—*Palaeochrum* is unique in having four, rather than the normal three, exposed abdominal segments with metallic coloration. The fifth and sixth segments are visible but are brown, non-metallic, and undoubtedly were exerted during the insect's efforts to extricate itself from the resin. An unusual feature is the simple tarsal claw. All recent elampines have one or more teeth on the inner edge of the claw except *Xerochrum* Bohart of the southwestern deserts in North America and *Prochridium* Linsenmaier from similar habitats in Egypt and Turkmen SSR. *Palaeochrum* has the general habitus of *Hedychridium* Abeille de Perrin which, however, has only three normally exposed abdominal segments, spinose posterolateral propodeal angles, and a toothed tarsal claw.

I assign *Omalus primordialis* Brues (1933: 153–154, figs. 83, 84) to *Palaeochrum*



Figs. 11-14. *Palaeochrum diversum*. 11, Habitus (dorsal view; appendages lacking except right forewing). 12, Head (frontal view). 13, Tarsal claws. 14, Abdomen (lateral view).

with some question. It was described from two females from Baltic amber attributed to the Oligocene in the Königsberg museum. Part of that amber collection was lost during World War II and part of it is now in Göttingen University, West Germany. Brues' type series is not in Göttingen so it must be presumed lost. His figures show a species having the habitus of *Palaeochrum* but with three abdominal segments; his description says "four tergites and an extremely short fifth." He could not ascertain the form of the tarsal claws but stated that the scapal basin was transversely ridged or striate. Brues described his species as black with no metallic reflections. It is unlikely that *primordialis* is conspecific with the metallic green *diversum* unless there was a post-mortem color change in the former species due to hydration.

*Palaeochrum diversum* Krombein, NEW SPECIES

Figs. 11–14

Male.—Length 2.3 mm, forewing 1.4 mm. Integument metallic green; tibiae, tarsi and abdominal segments 5–6 brown. Wings hyaline, stigma and veins dark brown. Vestiture short, inconspicuous, appressed on terga.

*Head*: Closely punctate becoming somewhat pitted on vertex; least interocular distance 0.37 times head width and 0.7 times interocular distance at posterior ocelli.

*Thorax*: Dorsum with close fine punctures; mesopleuron with larger contiguous pits; propodeum with smaller contiguous pits.

*Abdomen*: Dorsum polished, with small punctures mostly separated by slightly more than a puncture's width; second tergum anteriorly with small median area bearing fine close transverse carinae with interspersed small punctures; terminalia not visible.

Female.—Unknown.

Type-locality and -depository.—Gdansk-Skogie, Poland, Holocene fossil beach sediments, depth 12 or more meters, Tadeusz Giecewicz; redeposited from the "Blaue Erde" of Upper Eocene, Sambian Peninsula west of Kaliningrad, USSR. Museum of the Earth, Warsaw, Poland, No. 19774.

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